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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Atty Docket No.: 0913.103.US

In re the Patent application of

Jacqueline A. Haynes et al

Examiner: K. Christman

Serial No.: 09/836,165

Group Art Unit: 3713

Filed: April 18, 2001

For: Automated, Computer-Based Reading Tutoring Systems and Methods

APPEAL BRIEF

MAIL STOP: APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This brief is being submitted pursuant to the Notice of Appeal filed January 5, 2005, appealing the final rejection of claims 1-4, 18, 19, 22-25, 37, 39 and 40. The fee for filing a brief in support of an appeal is submitted herewith. This brief is being filed in triplicate.

(i) Real Party in Interest

The real party in interest is Intelligent Automation, Inc. by virtue of an assignment from the inventors recorded in the U.S. Patent and Trademark Office at reel 011718, frame 0740.

(ii) Related Appeals and Interferences

No other prior and pending appeals, interferences or judicial proceedings are

known to Appellants, Appellants' legal representative, or the assignee which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(iii) Status of Claims

Claims 1-19 and 22-44 are pending in the subject application. Claims 20 and 21 were previously canceled. Claims 5-17, 26-36, 38 and 41-44 stand allowed. Claims 1-4, 18, 19, 22-25, 37, 39 and 40 stand finally rejected and are the subject of this appeal.

(iv) Status of Amendments

An amendment was filed subsequent to the final rejection canceling claims 20 and 21. This amendment was entered by the Examiner as indicated in the Advisory Action dated January 14, 2005.

(v) Summary of Claimed Subject Matter

The following is a brief explanation of the subject matter defined in each independent claim under appeal, with reference to Appellants' specification and drawings. In addition, for each independent claim involved in the appeal and for each dependent claim argued separately in section (vii) herein which recites a means plus function or step plus function, the structure, material or acts described in the specification as corresponding to each claimed function are identified below with reference to the specification and, where appropriate, the drawings.

Independent claim 1 relates to an automated computer-based reading tutoring system 28 comprising at least one domain of discourse 31 accessible by a student via a

computer system 10 (specification, page 11, lines 12-18; Figs. 1-3). The domain of discourse includes a plurality of instructional passages 32 of different predetermined levels of reading difficulty available for the student to read via a monitor 12 of the computer system 10 (specification, page 12, lines 13-19; Figs. 1-3). Difficulty levels may be established using factors such as vocabulary, syntax, text structure and ease of comprehension (specification, page 24, lines 4-11). The reading tutoring system 28 includes semantic space method means, corresponding to the semantic space module 34, for receiving a summary prepared by the student and submitted via the computer system 10 of one of the instructional passages read by the student (specification, page 12, lines 17-19; Fig. 2). The reading tutoring system 28 further includes immediate feedback data 36 capable of being provided to the student via the computer system 10 (specification, page 13, lines 2-4; Fig. 2). The feedback data includes an indicator reflective of the conceptual congruence of the summary with the instructional passage read and summarized by the student (specification, page 17, lines 11-14; Fig. 4) and includes the identity of which of the instructional passages the student should read next (specification, page 17, lines 18-20; Fig. 4).

The semantic space method means 34 is further required by independent claim 1 to automatically evaluate the student's summary for congruence of content with the instructional passage read and summarized by the student (specification, page 7, lines 17-18; page 15, lines 15-19; Fig. 4) and to automatically determine which of the instructional passages from the domain of discourse the student should read next based on the congruence of the summary with the instructional passage the student has read and summarized (specification, page 7, lines 18-19; page 15, line 22 – page

16, line 3; Fig. 4). The semantic space module 34 constituting the semantic space method means comprises a body of software for executing a semantic space method or procedure by which the student's summary is related to data produced by a machine-learning method or procedure, such as latent semantic analysis (LSA), HAL and expected means (EM) (specification, page 13, lines 21-24). The machine-learning method learns associative relations between individual words and the meaning-bearing contexts in which they occur (specification, page 14, lines 14-15). The evaluation of the student-prepared summary performed with the semantic space method means 34 goes beyond operations based on matching words or phrases in user-constructed responses with predetermined key words or phrases found in model responses. The evaluation performed by the semantic space method means 34 considers the meaning-bearing contexts associated with the student-prepared summary and the instructional passage whereas evaluations based on matching words/phrases in user-constructed responses with key words/phrases in model responses do not consider such meaning-bearing contexts and, consequently, do not consider the overall conceptual similarities or similarity of meaning between the user-constructed responses and the model responses. As explained further below in Section (vii) of this brief, the inability of key word/phrase matching to consider meaning-bearing contexts of word usage makes it possible for words/phrases in a user-constructed response to match key words/phrases in a model response and, based on context of word usage, still be lacking in conceptual congruence with the model response. The semantic space method means 34 overcomes these disadvantages.

Appellants' specification describes the use of a machine-learning method to

produce data known as semantic spaces, and Appellants' description is provided with reference to the machine-learning method known as latent semantic analysis (LSA) (specification, page 14, lines 3-22; page 15, lines 7-11). Additional description of semantic spaces and/or latent semantic analysis techniques found in various U.S. patents is incorporated by reference into Appellants' specification (specification, page 14, line 22 – page 15, line 1). One of these patents, U.S. Patent No. 4,839,853 to Deerwester et al, is illustrative of the differences between evaluation techniques utilizing semantic spaces from techniques based on key word/phrase matching (Deerwester et al, column 1, line 35 – column 2, line 40). The Deerwester et al patent demonstrates how semantic spaces can be used to match a user-submitted query to the correct text objects from a database of text objects even though the query and the correct text objects share no common terms (Deerwester et al, column 4, lines 23-28). A copy of the Deerwester et al patent is submitted in Section (ix) of this brief and is discussed further below in Section (vii). The Deerwester et al patent constitutes evidence entered into the record by the Examiner by virtue of its incorporation by reference into Appellants' specification and its citation in an Information Disclosure Statement filed September 13, 2001, which was considered by the Examiner on January 6, 2004.

Dependent claim 2 requires the reading tutoring system of claim 1 to include one or more semantic spaces produced by a machine-learning method and further requires the semantic space method means 34 to include one or more semantic space algorithms operating on the one or more semantic spaces (specification, page 13, line 24 – page 14, line 4). The semantic spaces are very high-dimensional content vector spaces in which words or sets of words from text are represented as points

(specification, page 14, lines 10-13; Deerwester et al, column 3, lines 57-64; fig. 1), and the semantic space algorithm operates directly on this data to infer information about the quality of the text and to make decisions based on the inferences (specification, page 15, lines 8-11). The semantic space algorithm can be the cosine between vectors in the semantic spaces as disclosed by Deerwester et al (Deerwester et al, column 4, lines 15-19) and incorporated by reference into Appellants' disclosure.

Dependent claim 3 characterizes the machine-learning method of claim 2 as including a machine-learning algorithm incorporating latent semantic analysis (LSA) specification, page 14, lines 6-9 and 13-15). Latent semantic analysis (LSA) is a mathematical/statistical technique for extracting and inferring relations of expected contextual usage of words in passages of discourse and for determining and representing the similarity of meaning of words and passages (specification, page 14, lines 7-10). Latent semantic analysis (LSA) utilizes a machine-learning algorithm known as singular value decomposition (SVD). The characteristics of latent semantic analysis and singular value decomposition (SVD) are explained in Appellants' specification (page 14, lines 10-22) and in the Deerwester et al patent incorporated by reference into Appellants' specification (Deerwester et al, column 4, line 30 – column 6, line 55).

Independent claim 18 claims an automated computer-based reading tutoring system 28 comprising at least one domain of discourse 31 characterized in the same terms as the domain of discourse recited in claim 1. The reading tutoring system of claim 18 also comprises a semantic space derived from a machine-learning method (specification, page 14, lines 3-4 and 10-13; page 15, lines 7-8) and a semantic space

module 34 for receiving a summary prepared by the student and submitted via the computer system 10 of one of the instructional passages 32 read by the student (specification, page 12, lines 17-19; Fig. 2). The semantic space module 34 operates on the semantic space to automatically evaluate the summary for congruence with the one of the instructional passages (specification, page 15, lines 8-9 and 15-19) and to automatically determine which of the instructional passages from the domain of discourse the student should read next based on the congruence of the summary with the one of the instructional passages (specification, page 15, line 26 – page 16, line 3; Fig. 4). The reading tutoring system of claim 18 includes immediate feedback data 36 characterized in the same terms as the immediate feedback data of claim 1.

Dependent claim 19 calls for the semantic space of claim 18 to be derived from latent semantic analysis (LSA) (specification, page 14, lines 6-13).

Dependent claim 22 calls for the semantic space module 34 of claim 18 to include a semantic space algorithm operating on the semantic space (specification, page 15, lines 7-9).

Independent claim 23 recites an automated computer-based method of reading tutoring comprising the steps of providing a domain of discourse 31 accessible by a student via a computer system 10 and including a plurality of instructional passages 32 of different predetermined levels of reading difficulty (specification, page 11, lines 16-17; page 12, lines 13-17; page 22, line 22 – page 23, line 4; page 24, lines 12-14; Figs. 2 and 3); selecting one of the instructional passages 32 to appear on a monitor 12 of the computer system 10 for the student to read (specification, page 24, lines 14-19; Fig. 4); receiving a summary of the selected instructional passage prepared by the student

and submitted via the computer system 10 (specification, page 25, lines 7-12; Fig. 4); automatically evaluating the summary for congruence with the selected instructional passage to obtain a measure of the student's reading comprehension (specification, page 25, lines 17-20; Fig. 4); automatically selecting an instructional passage 32 from the domain of discourse 31 that the student should optimally read next based on the measure of the student's reading comprehension (specification, page 26, lines 6-10; page 27, lines 4-8; Fig. 4); communicating feedback data 36 to the student, via the computer system 10, including an indicator reflective of the student's reading comprehension (specification, page 25, line 22 – page 26, line 2; Fig. 4) and the identity of the instructional passage that the student should optimally read next (specification, page 26, lines 18-20; page 27, lines 4-8; Fig. 4); and repeating the receiving, automatically evaluating, automatically selecting and communicating steps for the instructional passage that the student reads next (specification, page 27, lines 12-14). The step of selecting one of the instructional passages for the student to read may be performed by the reading tutoring system or by the student (specification, page 24, lines 20-22; page 25, lines 3-4). The student's summary is automatically evaluated for congruence with the instructional passage by one or more semantic space modules 34 (specification, page 25, lines 17-19; Fig. 2). The step of automatically selecting an instructional passage that the student should read next may involve selecting a passage of higher, the same, or lower level of reading difficulty as the passage for which the student's summary was just evaluated (specification, page 26, lines 10-18; page 27, lines 4-7; Fig. 4). The feedback data may be communicated visually, audibly and/or in tangible written form (specification, page 25, lines 22-23).

Dependent claim 25 further limits claim 23 by requiring the step of automatically evaluating and the step of automatically selecting to be performed using semantic space algorithms (specification, page 15, lines 8-9 and 15-19; page 15, line 22 – page 16, line 4).

Independent claim 37 recites an automated computer-based method of self-guided reading tutoring comprising the steps of accessing a computer-based reading tutoring system 28 via a computer system 10 (specification, page 24, lines 13-14; Fig. 4); viewing a selected instructional passage from a domain of discourse 31 including a plurality of instructional passages 32 of different predetermined levels of reading difficulty, of the reading tutoring system on a monitor 12 of the computer system 10 (specification, page 25, lines 7-8; Fig. 4); reading the selected instructional passage (specification, page 25, lines 7-8); preparing a summary of the selected instructional passage (specification, page 25, lines 8-11; Fig. 4); submitting the summary to the reading tutoring system 28 via the computer system 10 (specification, page 25, lines 11-12; Fig. 4); receiving immediate feedback data 36 from the reading tutoring system 28 via the computer system 10 including an indicator reflective of the congruence of the summary with the selected instructional passage (specification, page 25, line 21 – page 26, line 2; Fig. 4) and including the identity of one or more recommended instructional passages from the domain of discourse that should be read next based on the congruence of the summary with the selected instructional passage (specification, page 26, lines 6-8 and 18-20; page 27, lines 3-8; Fig. 4); and repeating the steps of viewing, reading, preparing, submitting and receiving for one of the recommended instructional passages (specification, page 27, lines 12-14).

The only claims on appeal reciting a feature in means plus function language are independent claim 1 and dependent claim 2, which recite a semantic space method means. As discussed above, the semantic space method means of claims 1 and 2 corresponds to the semantic space module 34 described in Appellants' specification (specification, page 12, lines 17-19; page 13, line 18 – page 16, line 7; Fig. 2).

(vi) Grounds of Rejection to be Reviewed on Appeal

The grounds for rejection to be reviewed on appeal are the following:

(a) The rejection of claim 19 under 35 USC § 112, 1st paragraph, as failing to comply with the enablement requirement; and

(b) The rejection of claims 1-4, 18, 19, 22-25, 37, 39 and 40 under 35 USC §103(a) as being unpatentable over Fontana et al (6,361,326 B1) in view of Berman (6,461,166 B1).

(vii) Argument

(a) The rejection of claim 19 under 35 USC §112, 1st paragraph

Pursuant to the final Office Action of August 3, 2004, claim 19 as well as claims 20 and 21 were finally rejected under 35 USC §112, 1st paragraph, as failing to comply with the enablement requirement . However, since claims 20 and 21 were canceled subsequent to the final rejection, this rejection remains applicable to claim 19 alone and is submitted to be improper.

Claim 19 was finally rejected by the Examiner under 35 USC §112, 1st paragraph, on the grounds that the claim contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains to make and/or use the invention. In particular, it was stated by the Examiner

in the final Office Action that the specification does not clearly set forth how "the semantic space is derived from latent semantic analysis using a latent semantic analysis algorithm" (final Office Action, page 2, line 20 - page 3, line 3). The Examiner's statement regarding the alleged deficiencies in Appellants' disclosure is noted to be erroneous with respect to claim 19 because claim 19 does not require the semantic space to be derived from latent semantic analysis using a latent semantic analysis algorithm but only that the semantic space be derived from latent semantic analysis. As explained below, it is submitted that Appellants' specification including the disclosure incorporated therein by reference provides an enabling disclosure for a semantic space derived from latent semantic analysis as recited in claim 19.

Appellants' specification describes a semantic space derived from latent semantic analysis as a high-dimensional content vector space in which words or sets of words used in text are represented as points (specification, page 14, lines 10-13; page 15, lines 7-8). Appellants' specification also describes the use in latent semantic analysis of singular value decomposition (SVD), a mathematical matrix decomposition technique involving a high-dimensional linear decomposition of a matrix containing data on the frequency of use of individual words (specification, page 14, lines 16-20). The Deerwester et al patent (4,839,853) incorporated by reference into Appellants' specification discloses a semantic space (Fig. 1) and describes how the semantic space is derived from latent semantic analysis using singular value decomposition (SVD). The semantic space of Deerwester et al (Fig. 1) is a multi-dimensional content vector space in which words (shown as circles) or sets of words (shown by squares) from a file of text objects are represented as points (Deerwester et al, column 3, lines

57-64). Deerwester et al explains how the data used to plot the semantic space is obtained from latent semantic analysis by creating a matrix (Table 2) of terms from the text objects (Deerwester et al, column 3, lines 34-60) and then decompressing the matrix using singular value decomposition (SVD) (Deerwester et al, column 4, line 31 – column 6, line 55). Deerwester et al discloses a query vector Q in the semantic space based on words used in a user query or input (Deerwester et al, column 4, lines 9-15; Fig. 1). A measure of similarity between the user query and the text objects is related to the angle between the query vector and any given term or document vector (Deerwester et al, column 4, lines 15-23), one such measure being the cosine between the query vector and a given term or document vector (Deerwester et al, column 4, lines 18-19). Deerwester et al utilizes semantic spaces to identify and retrieve documents from the file of text objects relevant to the user query, whereas Appellants' invention utilizes semantic spaces to evaluate the congruence between an instructional passage and a student-prepared summary of the instructional passage. Nevertheless, the teachings provided by Deerwester et al, when considered in light of Appellants' disclosure, enable one of skill in the art to recognize that the semantic space of Appellants' reading tutoring system constitutes a multi-dimensional vector space based on words or sets of words from the instructional passage as obtained from singular value decomposition (SVD) of a matrix of words from the instructional passage.

The first paragraph of 35 USC §112 requires nothing more than objective enablement without resort to undue experimentation. Staehelin v. Secher, 24 USPQ 2nd 1513 (Bd. of Pat. Appls. and Int. 1992). A specification is not required to be a blueprint in order to satisfy the enablement requirement under 35 USC §112, 1st

paragraph. Id. at 1516. An application need not teach, and preferably omits, that which is known in the art. Hybritech, Inc. v. Monoclonal Antibodies, Inc.,802 F. 2nd 1367, 231 USPQ 481, 489 (Fed. Cir. 1984). Based on these standards, the totality of Appellants' specification constitutes sufficient disclosure to enable one of skill in the art to practice the invention claimed in claim 19, especially in view of the high level of skill possessed by an ordinary practitioner in the relevant art. Accordingly, it is courteously requested that the rejection of claim 19 under 35 USC §112, 1st paragraph, be reversed.

(b) The rejection of claims 1-4, 18, 19, 22-25, 37, 39 and 40 under 35 USC §103(a) as being unpatentable over Fontana et al (6,361,326 B1) in view of Berman (6,461,166 B1)

Independent claim 1 relates to an automated computer-based reading tutoring system and recites "at least one domain of discourse accessible by a student via a computer system, said at least one domain of discourse including a plurality of instructional passages of different, predetermined levels of reading difficulty ...; semantic space method means for receiving a summary prepared by the student and submitted via the computer system of one of said instructional passages read by the student, said semantic space method means being adapted to automatically evaluate the summary for congruence with said one of said instructional passages and to automatically determine which of said instructional passages ... the student should read next based on the congruence of the summary with said one of said instructional passages; and immediate feedback data ... including an indicator reflective of the congruence of the summary with said one of said instructional passages and including the identity of which of said instructional passages the student should read next." As

explained below, neither Fontana et al nor Berman relates to an automated computer-based reading tutoring system and neither teaches or suggests either a domain of discourse including a plurality of instructional passages of different predetermined levels of reading difficulty, a semantic space method means for receiving a student-prepared summary of an instructional passage, for automatically evaluating the summary for congruence with the instructional passage and for automatically determining which instructional passage the student should read next based on the congruence of the summary with the instructional passage, or immediate feedback data including an indicator reflective of the congruence of the summary with the instructional passage and including the identity of the instructional passage the student should read next.

Fontana et al discloses a computer-based system for teaching thinking skills and is not related to reading tutoring. The system of Fontana et al includes a plurality of source contents for selection by a user. The source contents may be presented to the user as text, graphics, holographics, pictures, transmitted energy forms and/or audio (Fontana et al, column 3, lines 25-35 and 48-51), and are not even required to be in textual or readable form. Where a source content is presented to a user as text, Fontana et al operates on the premise that the user is capable of reading and fully understanding the text. Fontana et al contemplates source contents of different subject matter topics, but not different predetermined levels of reading difficulty. The user of the system of Fontana et al investigates a selected source content using pre-programmed prompts associated with a particular thinking skill selected by the user. The prompts are presented to the user as pre-programmed questions and examples

which lead the user to understand the thinking skill and how to apply it (Fontana et al, column 1, line 57 – column 2, line 3; column 2, lines 26-30; column 4, lines 38-43; column 5, lines 1-15; column 11, lines 56-60). Accessing a prompt may result in retrieval and display of a clarification for the prompt, providing further explanation and/or examples of the prompt (Fontana et al, column 5, lines 16-23; column 11, lines 60-67). Notably, the guiding prompts facilitate mental exercises to be performed independently by the user without interaction with the computer system and, in particular, without submission of a user-constructed response. One of the thinking skills taught by the system of Fontana et al relates to evaluation of the source content; however, the system itself does not receive and evaluate a student-prepared summary of the source content.

Fontana et al discloses a notebook function allowing the user to save notes in an electronic notebook displayed on the monitor screen (Fontana et al, column 9, lines 7-9). However, there is no disclosure by Fontana et al that the notes can be user-prepared. Rather, Fontana et al discloses only that a user may drag a source from the display area to the notebook whereupon information, presumably pre-programmed by the system itself, about the source will be copied into the notebook automatically (Fontana et al, column 9, lines 9-12). The notes are merely stored by the system without being evaluated by the system for content (Fontana et al, column 9, lines 16-18).

Fontana et al discloses that user input to the system is accomplished by clicking on an icon or title using a mouse or other pointer device or contacting an icon or title on a display screen which is pressure sensitive (Fontana et al, column 4, lines 23-27). In

addition, a user may type in a key word to search for a particular source content (Fontana et al, column 11, lines 8-12). The types of user input disclosed by Fontana et al do not involve submission of a user-prepared summary and do not make it possible to submit a user-prepared summary.

In addition to Fontana et al failing to disclose any means for receiving a user-prepared summary as input, there is no disclosure whatsoever by Fontana et al of any feature corresponding to a semantic space method means or any other means capable of performing the functions recited in claim 1 for the semantic space method means. The semantic space method means is based on one or more semantic spaces, and Fontana et al fails to disclose any semantic spaces. The rudimentary processing functions performed by the system of Fontana et al in response to user input are limited to information retrieval and display (Fontana et al, column 3, line 61 – column 4, line 5; column 5, line 64 – column 6, line 12) and do not involve the high-level intellectual functions performed by the semantic space method means to automatically evaluate a student-prepared summary for conceptual congruence with an instructional passage and to automatically determine which instructional passage the student should read next based on this congruence.

Since the system of Fontana et al is not designed to receive and evaluate a user-prepared summary, the system also does not and cannot provide any feedback data reflective of an evaluation performed on a user-prepared summary. Although the system of Fontana et al is capable of suggesting source contents for the user, i.e. "editor's suggestions", the suggestions bear no relation to the results of an evaluation performed by the system on a user-prepared summary (Fontana et al, column 8, lines

4-9).

The Examiner maintains in the final Office Action that any limitation to reading in Appellants' claims is present only in the preamble of the claims, does not limit the structure of the claimed device, and recites only an intended use of structure. The Examiner's conclusions are submitted to be erroneous for the reason that independent claim 1 and every other independent claim on appeal requires in the body of the claim a plurality of instructional passages of different predetermined levels of reading difficulty. The requirement for instructional passages of different predetermined levels of reading difficulty limits the structure of the claimed device. In re Stencel, 4 USPQ 2nd 1071 (Fed. Cir. 1987). In addition, the other structural and/or functional limitations of the claims are based on the feature of instructional passages of different predetermined levels of reading difficulty, showing that Appellants' invention is directed to reading tutoring. The recitation of reading tutoring in the preamble, together with the structural and functional limitations recited in the body of the claims, breathe life and meaning into the claims and point out and complete the invention defined by the claims. Kropa v. Robie, 88 USPQ 478 (CCPA 1951); In re Hirao, 535 F. 2d 67, 190 USPQ 15 (CCPA 1976). Accordingly, the Examiner's failure to accord any patentable weight to Appellants' recitation of reading tutoring is believed to be improper.

The Examiner acknowledges that Fontana et al does not disclose a plurality of instructional passages of different predetermined levels of reading difficulty (Office Action of January 30, 2004, page 4, lines 18-19), but asserts it would have been obvious to modify the system of Fontana et al to include a plurality of instructional passages of different predetermined levels of reading difficulty since it is old and well

known in the area of adaptive educational systems to include "questions, topics, or content at a variety of difficulty levels" (Office Action of January 30, 2004, page 5, line 23 – page 6, line 1). The Examiner's broad reference to adaptive educational systems fails to make it obvious to provide instructional passages of different predetermined levels of reading difficulty in the system of Fontana et al. Fontana et al is not related to reading tutoring, operates under the assumption that the user is reading proficient and does not contemplate source contents of different predetermined levels of difficulty, much less reading difficulty. Moreover, the system described by Fontana et al lacks the technical features needed to implement an automated computer-based adaptive educational system having instructional passages of different predetermined levels of difficulty. The Examiner's assertion of obviousness with respect to modifying Fontana et al to include instructional passages of different predetermined levels of reading difficulty constitutes a clear departure from the teachings of Fontana et al and requires that the system of Fontana et al be totally reinvented using impermissible hindsight provided by Appellants' invention.

The Examiner admits that the system of Fontana et al does not receive a student-prepared summary of an instructional passage (Office Action of January 30, 2004, page 4, lines 6-7), but asserts it would have been obvious to modify Fontana et al to perform this feature in view of the discussion in Appellants' specification of summary writing as an effective way to develop reading comprehension together with the disclosure by Fontana et al of teaching content meaning and point of view (Office Action of January 30, 2004, page 4, lines 6-17). The Examiner's position ignores the fact that the system of Fontana et al lacks the technical features to receive a student-

prepared summary and to ascertain the quality of the summary for reading comprehension. Although the system of Fontana et al seeks to teach thinking skills including content meaning, the skills are taught by the system merely providing the user with prompts to engage in mental exercises independent of the system. The teaching approach taken by Fontana et al, together with Fontana et al's failure to provide any means for a student-prepared summary to be received and substantively processed, shows that the reference considered as a whole teaches away from the claimed invention and would not be obvious to modify in the manner asserted by the Examiner. Fontana et al fails to provide any motivation or any means for implementing the modification proposed by the Examiner, which requires the addition of features not even considered by Fontana et al.

The Examiner views the system of Fontana et al as being capable of receiving a student-prepared summary because Fontana et al discloses inputs that the user makes to the system, and the Examiner specifically refers to column 2, line 55 – column 3, line 8 of Fontana et al (final Office Action, page 6, lines 3-9). The passage of Fontana et al relied on by the Examiner does not contain any disclosure reflecting a capability for receiving a student-prepared summary and does not support the Examiner's position. Indeed, the passage relied on emphasizes the fact that the system of Fontana et al is limited to simple information retrieval and display as opposed to a conceptual congruence evaluation between a student-prepared summary and an instructional passage. In addition, the types of user inputs disclosed by Fontana et al (Fontana et al, column 4, lines 23-27; column 11, lines 8-12) cannot reasonably be interpreted as encompassing a student-prepared summary.

Even if the system of Fontana et al could be modified to receive a student-prepared summary of an instructional passage, the system of Fontana et al still lacks semantic space method means or any other means to evaluate the summary for conceptual congruence with the instructional passage. As pointed out above, Fontana et al is limited to performing the rudimentary processing functions of information retrieval and display not involving a congruence evaluation between a student-prepared summary of an instructional passage and the instructional passage itself. The Examiner concedes that Fontana et al does not disclose the recited semantic space method means (Office Action of January 30, 2004, page 4, lines 18-20) and relies on Berman for this feature as discussed further below.

The Examiner considers the guiding prompts and next area suggestions of Fontana et al as corresponding to the immediate feedback data recited in claim 1, and refers specifically to column 2, line 67 – column 3, line 8 of Fontana et al (Office Action of January 30, 2004, page 4, lines 1-4). The passage of Fontana et al relied on by the Examiner refers to retrieval and display of a guiding prompt associated with an evaluation thinking skill selected by the user, but says nothing of next area suggestions. As discussed above, guiding prompts are pre-programmed hints or suggestions which lead the user to understand the thinking skill through mental exercises engaged in by the user independent of the system. The guiding prompts bear no relation whatsoever to the congruence between an instructional passage and a student-prepared summary of the instructional passage, and the guiding prompts do not include an indicator reflective of the congruence of a student-prepared summary with an instructional passage as is required for the feedback data recited in claim 1. Where the system of

Fontana et al provides "editor's suggestions" (Fontana et al, column 8, lines 4-9), the suggestions bear no relation to an evaluation performed by the system on a user-prepared summary.

The aforementioned deficiencies of Fontana et al are not rectified by Berman. Berman relates to a computer-based learning system 10 for evaluating a user's acquisition of knowledge from a target knowledge component 42 comprising subject matter content presented to the user without regard to reading difficulty (Berman, column 3, lines 16-21). The subject matter content does not even have to be presented to the user in readable form (Berman, column 3, lines 21-22). The system 10 presents a question format 48 to the user comprising a series of test questions, such as multiple choice or fill in the blank questions, about the target knowledge and requiring the user to construct narrow answers to the questions in the user's own words (Berman, column 3, line 61 – column 4, line 4). An evaluation information component 30 of the system 10 includes a keyword component 44 as an associated set of words relevant to the target knowledge and supplied by the authors of the system (Berman, column 3, lines 22-47). These key words/phrases are used to construct the questions (Berman, column 3, lines 51-57). The evaluation information component evaluates the user-constructed answers or responses for the presence of words/phrases matching the predefined key word data contained in the evaluation information component (Berman, column 4, lines 30-33). Notably, this evaluation is based on a comparison between the user-constructed responses and predefined correct responses to the questions (Berman, column 1, lines 57-59 and 62-66). The system 10 of Berman provides feedback to the user in the form of either remedial information designed to elicit a correct response to a

question, further testing or advancement to new target knowledge material. Where new material is recommended, the new material constitutes "other target knowledge topics" (Berman, column 4, lines 59-62) without regard to level of difficulty.

Like Fontana et al, the system of Berman does not relate to reading tutoring and does not comprise instructional passages of different predetermined levels of reading difficulty. It is correctly conceded by the Examiner that Berman does not disclose instructional passages of different predetermined levels of difficulty (Office Action of January 30, 2004, page 5, lines 23-24). There is no disclosure by Berman of either the target knowledge component 42 or the predefined questions about the target knowledge comprising a plurality of instructional passages of different predetermined levels of reading difficulty. The target knowledge component and the predefined questions do not even have to be presented to the user in readable form. For the reasons discussed above in connection with Fontana et al, the Examiner's reference to adaptive educational systems does not make it obvious to modify Berman to include instructional passages of different predetermined levels of reading difficulty.

Berman like Fontana et al does not disclose any means for receiving a student-prepared summary of an instructional passage. The predefined questions presented by the system of Berman are multiple choice or fill in the blank questions (Berman, Fig. 2c) intended to elicit a narrow and specific user-constructed response and not a summary of an instructional passage. The user-constructed responses received by the Berman system, being answers to multiple choice or fill in the blank questions, are not summaries of the target knowledge itself. Moreover, the user-constructed responses to the questions are, by nature, not summaries of the questions themselves. The system

of Berman thusly does not have any means whatsoever for receiving a student-prepared summary of an instructional passage read by the student.

Berman like Fontana et al does not disclose a semantic space method means as construed in accordance with Appellants' description and does not disclose any means capable of performing the functions recited in claim 1 for the semantic space method means. Berman does not disclose the evaluation information component 30 or any other component of the system 10 as having a semantic space and, as discussed immediately above, does not disclose any means for performing the function of receiving a student-prepared summary of an instructional passage. In addition, Berman fails to disclose semantic space method means or any other means to automatically evaluate a student-prepared summary of an instructional passage for conceptual congruence with the instructional passage itself, as opposed to a right or wrong answer to a multiple choice or fill in the blank question. It would be illogical for the evaluation information component 30 of Berman to evaluate a user-constructed response to a question for congruence with the question itself since a question by nature does not contain the information it is intended to elicit. Since a user-constructed response to a question can contain key words/phrases from the target knowledge component and still be an incorrect answer to the particular question, the evaluation information component 30 of Berman must evaluate the user-constructed response by key word/phrase matching to the predefined model correct responses contained in the system. The evaluation performed by Berman thusly compares the user-constructed response with a model response that the user does not read or have access to. This is in direct contrast with the claimed invention which requires the semantic space method means to

evaluate the student-prepared summary of the instructional passage for congruence with the instructional passage itself, which has been read by the student, and to automatically determine which instructional passage the student should read next based on this congruence. Neither function can be performed by any of the features or components that Berman discloses.

Even if the system of Berman could be modified to receive a student-prepared summary of an instructional passage, the evaluation based on key word/phrase matching disclosed by Berman is unsuitable for evaluating a student-prepared summary of an instructional passage for conceptual congruence with the instructional passage in the manner of a semantic space method means. In contrast to the semantic space method means, the evaluation disclosed by Berman does not consider the meaning-bearing contexts of word usage. Berman's evaluation would incorrectly find conceptual congruence between an instructional passage and a student-prepared summary of the instructional passage where words/phrases in the summary match key words/phrases derived from the instructional passage even though the words/phrases in the summary, when taken in context, reflect a lack of conceptual understanding of the instructional passage. Accordingly, Berman fails to provide any teachings or suggestions which, when combined in the system of Fontana et al, would arrive at a system having a semantic space method means or any other means for performing the functions recited for the semantic space method means in independent claim 1.

It follows that the system of Berman, like Fontana et al, does not and cannot provide immediate feedback data including an indicator reflective of the congruence of a student-prepared summary with an instructional passage and including the identity of

an instructional passage the student should read next. The feedback provided by the learning system of Berman is merely reflective of a right or wrong answer to a specific question. Where the system of Berman recommends new material for a student, the new material constitutes other topics without regard to level of difficulty and, in particular, reading difficulty.

It is seen from the above that there are no teachings or suggestions whatsoever in Berman which, when combined with Fontana et al, arrive at the claimed invention. Neither Fontana et al nor Berman relates to a reading tutoring system. Neither reference discloses a plurality of instructional passages of different predetermined levels of reading difficulty, and to interpret either reference as disclosing this feature requires conjecture and impermissible hindsight made possible only from the teachings of Appellants' invention. As pointed out above, the systems of Fontana et al and Berman employ topics of different subject matter; however, different subject matter topics bear no relation to topics of different levels of difficulty, much less different predetermined levels of reading difficulty. In the systems of Fontana et al and Berman, it is not even necessary for the subject matter topics to be presented to the user in readable form. Considered individually and in any reasonable combination, Fontana et al and Berman fail to provide the technical features needed to implement an automated computer-based adaptive educational system having instructional passages of different predetermined levels of difficulty, much less different predetermined levels of reading difficulty. Since neither Fontana et al nor Berman discloses or suggests any means for receiving a student-submitted summary of an instructional passage read by the student, it follows that the system of Fontana et al as modified by Berman would not include any

means for receiving a student-prepared summary of an instructional passage read by the student. Neither Fontana et al nor Berman discloses a semantic space method means or any other means capable of performing the functions recited for the semantic space method means. Accordingly, the system of Fontana et al cannot be modified by Berman to obtain the feature of a semantic space method means. Considered individually or in any reasonable combination, Fontana et al and Berman do not disclose or suggest immediate feedback data including an indicator reflective of the congruence of a student-prepared summary with an instructional passage and including the identity of which instructional passage the student should read next.

It is fundamental that rejections under 35 USC §103 must be based on evidence, and the Examiner has the burden of providing the evidence necessary to establish a prima facie case of obviousness. In re Grasselli, 713 F. 2d 731, 218 USPQ 769 (Fed. Cir. 1983); In re Piasecki, 745 F. 2d 1468, 223 USPQ 785 (Fed. Cir. 1984). The Examiner's burden can be sustained only by showing some objective teaching in the prior art, or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references to arrive at the claimed invention. In re Fine, 837 F. 2d 1071, 5 USPQ 2d 1596 (Fed. Cir. 1988). It is impermissible to use the claimed invention as an instruction manual or template to piece together isolated disclosures and teachings of the prior art so that the claimed invention may be rendered obvious. Ex parte Haymond, 41 USPQ 2d 1217 (Bd. Pat. Appls. and Int. 1996). A rejection based on Section 103 must rest on a factual basis, with the facts interpreted without hindsight reconstruction of the invention from the prior art. Id. The Examiner may not resort to speculation, unfounded assumption or

hindsight reconstruction to supply deficiencies in the factual basis. In re Warner, 154 USPQ 173 (CCPA 1957), cert. denied, 389 U.S. 1057 (1968).

In the present case, both Fontana et al and Berman individually fail to teach or suggest the essential features of claim 1, and these features cannot be imparted to either reference without improperly exceeding the reasonable metes and bounds of its disclosure. Lacking these features individually, the references cannot be combined to obtain the claimed invention without resorting to improper speculation, unfounded assumption and impermissible hindsight reconstruction using Appellants' claimed invention as a template. The prior art relied on, considered singly or in any reasonable combination, fails to provide any teachings or suggestions by which the system of Fontana et al can be modified by Berman to obtain the claimed invention and fails to provide a factual basis to support the modifications asserted to be obvious by the Examiner. Accordingly, the rejection of independent claim 1 as being unpatentable over Fontana et al in view of Berman is submitted to be improper as a matter of law and should be reversed along with the final rejection of its dependent claims 2-4.

Dependent claim 2 is submitted to be patentable in its own right over Fontana et al in view of Berman for its recitation of one or more semantic spaces produced by a machine-learning method and one or more semantic space algorithms operating on the one or more semantic spaces. As explained above in connection with claim 1, neither Fontana et al nor Berman discloses a semantic space as described in Appellants' specification as a multi-dimensional content vector space in which words and sets of words taken from text are represented as points. As pointed out above, Appellants' specification describes production of the semantic space from a machine-learning

method called latent semantic analysis (LSA), and neither Fontana et al nor Berman contemplates latent semantic analysis (LSA) or any other machine-learning method to produce a semantic space. As explained in Section (v) of this brief, a semantic space algorithm, such as the cosine between vectors in the semantic space, operates on the semantic space to provide a measure of similarity, and no such algorithm operating on a semantic space is disclosed by Fontana et al or Berman.

The Examiner relies on Berman as disclosing the features recited in claim 2, but the features recited in claim 2 are not disclosed or suggested within the reasonable metes and bounds of Berman's disclosure. In particular, a semantic space as described in Appellants' specification is not disclosed by Berman and is not inherent to the key word/phrase matching evaluation performed by the system of Berman. There are no teachings by Berman of the key words/phrases being represented as points in a multi-dimensional content vector space and to conclude otherwise requires that Berman be reconstructed with the benefit of hindsight from Appellants' invention. Furthermore, Berman does not contemplate the use of a machine-learning method for any reason, much less production of one or more semantic spaces. Indeed, Berman explicitly discloses that the key words/phrases are produced by human authors of the system (Berman, column 2, lines 42-47). Lacking any disclosure whatsoever of a semantic space, Berman cannot properly be interpreted as disclosing an algorithm operating on a semantic space. Berman thusly fails to provide any teachings combinable with Fontana et al to obtain the invention as recited in claim 2. Accordingly, the rejection of claim 2 is submitted to be clearly improper as a matter of law and should be reversed.

Dependent claim 3 is considered to be patentable in its own right over Fontana

et al in view of Berman for its recitation of a machine-learning method that includes a machine-learning algorithm incorporating latent semantic analysis. As pointed out above in connection with claim 2, neither Fontana et al nor Berman discloses a machine-learning method, much less a machine-learning method incorporating latent semantic analysis. Contrary to the Examiner's assertion, the methodology of Berman is not equivalent to latent semantic analysis as described in Appellants' specification including the patents incorporated by reference into Appellants' specification. As explained above in Section (v) of this brief, Appellants' specification describes a machine-learning method incorporating latent semantic analysis as utilizing a machine-learning algorithm known as singular value decomposition (SVD) to produce a semantic space. Such a methodology is totally unrelated to the key word/phrase matching methodology of Berman, and Berman does not contain any teachings whatsoever which would suggest any recognition of a machine-learning method or of latent semantic analysis in particular. The teachings of Berman, when combined with the teachings of Fontana et al, do not arrive at the invention claimed in claim 3, and any conclusion to the contrary requires that the teachings of Berman be improperly expanded using impermissible hindsight made possible only from the teachings of Appellants' invention. It is submitted, therefore, that the rejection of dependent claim 3 is insufficient as a matter of law and should be reversed.

Independent claim 18 relates to an automated computer-based reading tutoring system and recites at least one domain of discourse and immediate feedback data expressed in the same terms as the domain of discourse and immediate feedback data of independent claim 1. As explained in the discussion of independent claim 1 set forth

above, neither Fontana et al nor Berman relates to a reading tutoring system and neither reference discloses or suggests a domain of discourse or immediate feedback data as characterized in claim 18. Claim 18 also recites "a semantic space derived from a machine-learning method" and "a semantic space module for receiving a summary prepared by the student ... of one of said instructional passages ..., said semantic space module operating on said semantic space to automatically evaluate the summary for congruence with said one of said instructional passages and to automatically determine which of said instructional passages from said domain of discourse the student should read next based on the congruence of the summary with said one of said instructional passages". As pointed out above, neither Fontana et al nor Berman discloses or suggests a semantic space, and a semantic space is not inherent to the systems of Fontana et al or Berman. The failure of both Fontana et al and Berman to teach or suggest a semantic space module, or any component for that matter, capable of receiving a student-prepared summary of an instructional passage, of automatically evaluating the student-prepared summary for congruence with the instructional passage itself and of determining the instructional passage the student should read next based on this congruence is discussed above. The individual deficiencies of Fontana et al and Berman with respect to the features recited in independent claim 18 are not rectified when the teachings of the references are combined. Accordingly, the rejection of independent claim 18 and its dependent claims 19 and 22 is clearly improper and should be reversed.

Dependent claim 19 is considered to be patentable over Fontana et al in view of Berman in its own right for the recitation of a semantic space derived from latent

semantic analysis. Fontana et al and Berman do not explicitly or inherently disclose or suggest a semantic space, much less a semantic space derived from latent semantic analysis, and arguments in support of this position have been discussed above in connection with claim 3. Accordingly, the rejection of claim 19 is submitted to be clearly improper and should be reversed.

Dependent claim 22 is considered to be patentable over Fontana et al in view of Berman in its own right for its recitation of a semantic space module that includes a semantic space algorithm operating on the semantic space. The failure of Fontana et al and Berman, individually and in combination, to teach or suggest a semantic space algorithm operating on a semantic space is discussed above in connection with dependent claim 2. From this discussion, it is evident that the rejection of dependent claim 22 is clearly improper as a matter of law and should be reversed.

Independent claim 23 relates to an automated computer-based method of reading tutoring and, as pointed out above, Fontana et al and Berman are not related to reading tutoring. The method recited in claim 23 comprises the steps of "providing a domain of discourse ... including a plurality of instructional passages of different, predetermined levels of reading difficulty; selecting one of the instructional passages ... for the student to read; receiving a summary of the selected instructional passage prepared by the student ...; automatically evaluating the summary for congruence with the selected instructional passage to obtain a measure of the student's reading comprehension; automatically selecting an instructional passage ... that the student should optimally read next based on the measure of the student's reading comprehension; communicating feedback data to the student ... including an indicator

reflective of the student's reading comprehension and the identity of the instructional passage that the student should optimally read next; and repeating said receiving, said automatically evaluating, said automatically selecting and said communicating steps for the instructional passage that the student reads next." The steps recited in independent claim 23 are not disclosed by Fontana et al or Berman and are not inherent to practicing the systems of Fontana et al and Berman. Neither reference recognizes the provision of instructional passages of different predetermined levels of reading difficulty but only different subject matter topics without any regard whatsoever to predetermined levels of difficulty. The systems of Fontana et al and Berman do not even require that the subject matter topics be provided to the user in readable form. Neither Fontana et al nor Berman involves receiving a summary prepared by a student of an instructional passage that the student has read. In both Fontana et al and Berman, no user-constructed responses are received by the systems which can fairly be considered a summary of an instructional passage. The step of automatically evaluating as recited in claim 23 is not disclosed or suggested by Fontana et al and Berman considered singly or in any reasonable combination. Neither reference discloses a system having the capability for automatically evaluating a student-prepared summary of an instructional passage for congruence with the instructional passage itself to obtain a measure of the student's reading comprehension. The steps recited in claim 23 of automatically selecting and communicating are all required to be based on the measure of the student's reading comprehension obtained from the step of evaluating, and these steps cannot be considered obvious over Fontana et al as modified by Berman because neither reference discloses or suggests a system that

performs or is capable of performing the steps of automatically selecting and communicating based on a measure of the student's reading comprehension obtained from a congruence evaluation. The feedback communicated by the systems of Fontana et al and Berman bears no relation to reading comprehension. It is submitted, therefore, that the rejection of independent claim 23 as being unpatentable over Fontana et al in view of Berman is clearly improper and should be reversed along with the rejection of its dependent claims 24 and 25.

Dependent claim 25 is considered to be patentable over Fontana et al in view of Berman in its own right for its recitation of the steps of automatically evaluating and automatically selecting being performed using semantic space algorithms. As discussed above for dependent claims 2 and 22, Fontana et al and Berman do not individually or in combination disclose or suggest semantic space algorithms. Accordingly, the recited steps of evaluating and selecting performed using semantic space algorithms cannot properly be considered obvious over Fontana et al and Berman. The Examiner's rejection of dependent claim 25 is thusly submitted to be improper and requires reversal.

Independent claim 37 relates to an automated computer-based method of self-guided reading tutoring and recites the steps of "accessing a computer-based reading tutoring system" and "viewing a selected instructional passage from a domain of discourse including a plurality of instructional passages of different predetermined levels of difficulty". As pointed out above, neither Fontana et al nor Berman relates to a reading tutoring system and neither reference explicitly or inherently discloses or suggests a plurality of instructional passages of different predetermined levels of

reading difficulty. Fontana et al and Berman, considered singly or in combination, thusly do not and cannot disclose or suggest the steps recited in claim 37 of accessing a computer-based reading tutoring system and viewing a selected instructional passage from a domain of discourse including a plurality of instructional passages of different predetermined levels of reading difficulty. Independent claim 37 further recites the steps of "reading the selected instructional passage", "preparing a summary of the selected instructional passage", and "submitting the summary to the reading tutoring system". The systems of Fontana et al and Berman do not involve a user reading an instructional passage, preparing a summary of the instructional passage, and submitting the summary to the system. As discussed above, the systems of Fontana et al and Berman are not designed for the submission of a user-prepared summary of an instructional passage, and the steps of preparing and submitting recited in claim 37 are not disclosed by or inherent to Fontana et al and/or Berman. The additional step recited in claim 37 of "receiving immediate feedback data from the reading tutoring system including an indicator reflective of the congruence of the summary with the selected instructional passage and including the identity of one or more recommended instructional passages ... that should be read next based on the congruence" is not disclosed or suggested by Fontana et al and/or Berman. In Fontana et al and Berman, the feedback that a user receives is totally unrelated to the congruence between a student-prepared summary of an instructional passage and the instructional passage itself. Where the system of Berman provides feedback based on a correct or incorrect answer to a question, this feedback must be based on the occurrence of words/phrases in the user's answer matching key words/phrases in model correct answers. As pointed

out above, the user-constructed answers in Berman cannot be evaluated for congruence with the target knowledge itself because words/phrases in the user-constructed answer can match key words/phrases in the target knowledge and still be an incorrect answer to the question and/or demonstrate a lack of conceptual congruence with the target knowledge based on their context of usage. The teachings of Fontana et al and Berman, when combined, do not arrive at the method claimed in claim 37, and the method as claimed is not made obvious by Fontana et al and Berman. Accordingly, the rejection of independent claim 37 is clearly improper as a matter of law and should be reversed along with the rejection of its dependent claims 39 and 40.

<u>(viii) Claims Appendix</u>

Claims 1, 2, 3, 4, 18, 19, 22, 23, 24, 25, 37, 39 and 40 involved in the subject appeal are set forth below.

1. An automated, computer-based reading tutoring system comprising

at least one domain of discourse accessible by a student via a computer system, said at least one domain of discourse including a plurality of instructional passages of different, predetermined levels of reading difficulty available for the student to read via a monitor of the computer system;

semantic space method means for receiving a summary prepared by the student and submitted via the computer system of one of said instructional passages read by the student, said semantic space method means being adapted to automatically evaluate the summary for congruence with said one of said instructional passages and to automatically determine which of said instructional passages from said

domain of discourse the student should read next based on the congruence of the summary with said one of said instructional passages; and

immediate feedback data capable of being provided to the student via the computer system and including an indicator reflective of the congruence of the summary with said one of said instructional passages and including the identity of which of said instructional passages the student should read next.

2. The automated, computer-based reading tutoring system as recited in claim 1 and further including one or more semantic spaces produced by a machine-learning method and wherein said semantic space method means includes one or more semantic space algorithms operating on said one or more semantic spaces.

3. The automated, computer-based reading tutoring system as recited in claim 2 wherein said machine-learning method includes a machine learning algorithm incorporating latent semantic analysis.

4. The automated, computer-based reading tutoring system as recited in claim 2 and further including a graphical user interface by which said reading tutoring system communicates with the student via the computer system.

18. An automated, computer-based reading tutoring system comprising

at least one domain of discourse accessible by a student via a computer system, said at least one domain of discourse including a plurality of instructional passages of different, predetermined levels of reading difficulty available for the student to read via a monitor of the computer system;

a semantic space derived from a machine learning method;

a semantic space module for receiving a summary prepared by the student and

submitted via the computer system of one of said instructional passages read by the student, said semantic space module operating on said semantic space to automatically evaluate the summary for congruence with said one of said instructional passages and to automatically determine which of said instructional passages from said domain of discourse the student should read next based on the congruence of the summary with said one of said instructional passages; and

immediate feedback data capable of being provided to the student via the computer system and including an indicator reflective of the congruence of the summary with said one of said instructional passages and including the identity of which of said instructional passages the student should read next.

19. The automated, computer-based reading tutoring system as recited in claim 18 wherein said semantic space is derived from latent semantic analysis.

22. The automated, computer-based method of reading tutoring as recited in claim 18 wherein said semantic space module includes a semantic space algorithm operating on said semantic space.

23. An automated, computer-based method of reading tutoring comprising the steps of

providing a domain of discourse accessible by a student via a computer system and including a plurality of instructional passages of different, predetermined levels of reading difficulty;

selecting one of the instructional passages to appear on a monitor of the computer system for the student to read;

receiving a summary of the selected instructional passage prepared by the student and submitted via the computer system;

automatically evaluating the summary for congruence with the selected instructional passage to obtain a measure of the student's reading comprehension;

automatically selecting an instructional passage from the domain of discourse that the student should optimally read next based on the measure of the student's reading comprehension;

communicating feedback data to the student, via the computer system, including an indicator reflective of the student's reading comprehension and the identity of the instructional passage that the student should optimally read next; and

repeating said receiving, said automatically evaluating, said automatically selecting and said communicating steps for the instructional passage that the student reads next.

24. The automated, computer-based method of reading tutoring as recited in claim 23 wherein said step of receiving includes receiving an audible summary from the student.

25. The automated, computer-based method of reading tutoring as recited in claim 23 wherein said step of automatically evaluating and said step of automatically selecting are performed using semantic space algorithms.

37. An automated, computer-based method of self-guided reading tutoring comprising the steps of

accessing a computer-based reading tutoring system via a computer system;

viewing a selected instructional passage from a domain of discourse, including a plurality of instructional passages of different, predetermined levels of reading difficulty, of the reading tutoring system on a monitor of the computer system;

reading the selected instructional passage;

preparing a summary of the selected instructional passage;

submitting the summary to the reading tutoring system via the computer system;

receiving immediate feedback data from the reading tutoring system via the computer system including an indicator reflective of the congruence of the summary with the selected instructional passage and including the identity of one or more recommended instructional passages from the domain of discourse that should be read next based on the congruence of the summary with the selected instructional passage; and

repeating said steps of viewing, reading, preparing, submitting and receiving for one of the recommended instructional passages.

39. The automated, computer-based method of self-guided reading tutoring as recited in claim 37 wherein said step of submitting includes submitting a written summary.

40. The automated, computer-based method of self-guided reading tutoring as recited in claim 37 wherein said step of submitting includes submitting an audible summary.

(ix) Evidence Appendix

A copy of U.S. Patent No. 4,839,853 to Deerwester et al is attached hereto. The

Deerwester et al patent is evidence of record by virtue of being incorporated by reference in Appellants' specification and being cited in an Information Disclosure Statement filed September 13, 2001, which was considered by the Examiner on January 6, 2004.

(x) Conclusion

In view of the above, the final rejection of claims 1-4, 18, 19, 22-25, 37, 39 and 40 is submitted to be clearly improper, and it is courteously solicited that the final rejection be reversed.

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I hereby certify that this correspondence is being deposited with the U.S. Postal Service with sufficient postage as first class mail in an envelope addressed to: MAIL STOP: APPEALS, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450 on March 4, 2005.

Ann L. Shebovsky